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1. Introduction

Aggressiveness is a stigma frequently associated with schizophrenia (SZ) (Barry et al., 2013; Pescosolido et al., 2010). Although on a societal level the proportion of violent crime committed by patients with psychotic disorders is low (less than 10% of the total acts of violence) (Fazel et al., 2009a), there is widespread evidence of a greater risk of violence in SZ patients compared to the general population (Fazel et al., 2009a; Fazel and McGrath, 2014; Tiihonen et al., 1997). Risk factors for violence in SZ patients are increasingly studied to better prevent and handle acts of violence. Commonly reported risk factors are: male gender and younger age (Shaw et al., 2006), single status and unemployment (Elbogen and Johnson, 2009), being violently victimized in the past (Rund, 2018; Witt et al., 2013), previous acts of violence (Witt et al., 2015), deterioration or limitation of cognitive functions (Fullam and Dolan, 2008), anti-social personality (Abushua'leh and Abu-Akel, 2006), substance abuse (Fazel et al., 2010, 2009b; Rund, 2018), invasive psychotic symptoms mainly related to the positive dimension (Swanson et al., 2006), first episode of psychosis (Large and Nielssen, 2011; Nielssen and Large, 2010), non-adherence to psychiatric care (Witt et al., 2013) and lack of antipsychotics (Fazel et al., 2014; Swanson et al., 2008).

Findings on insight as a risk factor for aggressiveness are contradictory (Bonnet et al., 2016), due to considerable methodological and conceptual shortcomings, including heterogeneity in the definition and assessment of insight and violence, a minority of prospective studies and the lack of systematic consideration of possible confounding variables.

The meta-analyse of Witt in 2013 found that violence was strongly associated with a lack of insight (OR = 2.7) according to 6 studies (Witt et al., 2013). But this finding is based on a dichotomous approach to insight while it has been described as a multidimensional state, heterogeneous in its intensity and changing over time (Capdevielle et al., 2013; Raffard et al., 2008). For this reason, studies focusing on insight use multi-dimensional scales such as the Scale to assess Unawareness of Mental Disorder (SUMD) (Amador, 1990), the Insight and Treatment Attitudes Questionnaire (ITAQ) (McEvoy et al., 1981) and the Schedule for Assessment of Insight (SAI) (David et al., 1992). These scales explore the awareness of having a mental illness, of its symptoms and consequences, as well as treatment necessity. Insight is mainly negatively correlated with the severity of psychotic symptoms but positively correlated with depressive symptoms (Mintz et al., 2003a).

Several retrospective studies using a multidimensional approach found an negative

association between insight and violence (Buckley et al., 2004; Ekinci et al., 2012). In a prospective study in 1999, Arango also found a significant negative association in a sample of 63 SZ patients (Arango et al., 1999) but in a later longitudinal study of 46 SZ patients lower scores on the different insight dimensions were not predictors of acts of violence (Arango et al., 2006). In a cross-sectional multicentric US study of 1410 SZ patients measuring violent behaviour over a period of 6 months, no association was found with the different insight dimensions (Swanson et al., 2006).

Regarding aggressiveness, there is no consensual definition. It is often studied focusing only on violent acts with the « Over Aggression Scale » (OAS) (Yudofsky et al., 1986), or on risk factors with the « Historical, Clinical and Risk (HCR) management variables-20 » (Webster et al., 1997) and the MacArthur Community Violence Interview (Steadman et al., 1998). Few studies look beyond the instrumental dimension of aggressiveness and focus on a multi-dimensional approach as explored by the Buss-Perry Aggression Questionnaire (BPAQ) (Buss and Perry, 1992). It is important to take into account the emotional (anger) and cognitive (hostility) components of aggressiveness to better understand the processes that precede the acts of violence and the relationship with complex clinical states such as awareness of illness.

The objective of our study was to examine the relationship between insight and aggressiveness both as multidimensional concepts, in a cross-sectional study involving a large sample of SZ patients. We assume that the association between insight and aggressiveness will vary according to the dimensions.

2. Methods

2.1. Population

The FondaMental Academic Centers of Expertise for Schizophrenia (FACE-SZ) cohort is drawn from an on-going French national network of 10 schizophrenia expert centers (Bordeaux, Clermont-Ferrand, Colombes, Créteil, Grenoble, Lyon, Marseille, Montpellier, Strasbourg and Versailles), set up by the FondaMental Foundation (www.fondation-fondamental.org) (Schürhoff et al., 2015).

Stable patients aged 15 years and above were referred by their general practitioner or psychiatrist to the expert centers for an in-depth assessment. Those diagnosed with schizophrenia, schizoaffective disorder or schizophreniform disorder according to DSM-IV-

TR criteria were subsequently enrolled in the FACE-SZ cohort. The assessment protocol was approved by the relevant ethical review board (CPP-Ile de France IX, January 18th, 2010).

The cohort included 779 patients in September 2016 when the data were extracted, of which 113 were excluded (3 were aged above 65, 110 had missing data on the BPAQ). The analysis was carried out on 666 patients.

2.2. Data collected

2.2.1. General assessment

Each patient was evaluated at inclusion using standardized psychiatric, somatic and neuropsychological assessments and using dedicated electronic medical records. Patients were interviewed by members of the multidisciplinary team.

Socio-demographic data and clinical history were recorded: age, gender, education level, marital status, professional status, housing conditions, age of the first psychotic episode and of the first treatment, duration of untreated psychosis, recent psychotic episode, severity of current psychotic psychopathology, current treatment, substance abuse, depression and global functioning.

Diagnostic interviews were carried out by psychiatrists according to the Structured Clinical Interview for DSM-IV (SCID).

Psychotic and general psychopathology was assessed using Positive And Negative Syndrome Scale (PANSS) (Kay et al., 1987).

Current depressive symptoms were evaluated using the Calgary Depression Scale for Schizophrenia (CDSS). Clinical depression was defined as a score $\geq$6 (Addington et al., 1993). Global Assessment of Functioning (GAF) (Jones et al., 1995) was used to evaluate functioning.

2.2.2. Aggressiveness measurement

Aggressiveness was measured using the validated French version (Bouchard, 2007) of the Buss–Perry Aggression Questionnaire (BPAQ), a 29-item self-report scale (Buss and Perry, 1992). It is considered to be a trait measure of individual aggressive tendencies. Replicated factor analysis yielded four scales: physical aggressiveness (9 items), verbal aggressiveness (5 items), anger (7 items), and hostility (8 items). Physical and verbal aggressiveness represent the instrumental dimensions of aggressiveness, anger the emotional dimension and hostility the cognitive dimension. Each of the 29 items is rated on a 5-point scale (1-5), with a total

BPAQ score ranging from 29 to 145 (9 to 45 for physical aggressiveness, 5 to 25 for verbal aggressiveness, 7 to 35 for anger, and 8 to 40 for hostility). High scores reflect higher levels of aggressiveness.

2.2.3. Insight measurement

Insight was evaluated using the abbreviated version of the Scale to assess Unawareness of Mental Disorder (SUMD) (Amador, 1990; Michel et al., 2013), validated in French (Raffard et al., 2010). This version is a standardised expert-rating scale based on a patient interview and comprises 9 items concerning current awareness of the following states: 1) having a mental disorder, 2) consequences of a mental disorder, 3) effects of treatment, 4) hallucinatory experiences, 5) delusional ideas, 6) disorganised thoughts, 7) blunted affect, 8) anhedonia and 9) lack of sociability. Each item was rated as follows: not applicable (0), aware (1), slightly aware/unaware (2), and seriously unaware (3). Symptom awareness was explored only if the patient was sufficiently symptomatic (i.e. score $\geq$ 3 on the PANSS for the same item). For the last 6 items (symptom evaluation), symptom attribution was rated as follows: not applicable (0), correct attribution (1), partial attribution (2) and incorrect attribution (3).

In our study, we calculated an average symptom awareness score by dividing the sum of scores on items 4 to 9 by the number of items with a score>0. Patients with ratings of 0 (Not applicable) for all 5 symptom items were reclassified as 1 (Aware). Scores of 0 and 1 were also grouped together for items 1, 2 and 3. Indeed, from a clinical perspective 'not applicable' is usually chosen when a low level of illness or symptoms or an absence of medication makes the investigation of insight not relevant.

The symptom attribution score was calculated by dividing the sum of scores on items 4 to 9 by the number of items with a score>0. Patients with all 5 items rated as 'not applicable' for attribution were considered as missing values as these scores reflected a heterogeneous group of patients who were, for each item, either symptom-free or lacking symptom awareness.

The Birchwood Insight Scale (BIS) was also used to evaluate insight (Birchwood et al., 1994). This brief self-report questionnaire is composed of 8 items with 3 possible answers (agree/disagree/not certain), grouped into 3 sub-scales: awareness of having a mental illness (2 items, score range 0-4), awareness or relabelling of symptoms (2 items, score range 0-4), awareness of necessity of treatment (4 items, score range 0-8).

2.3. Statistical analysis

The patient sample is described in **Table 1** for the main socio-demographic and clinical variables. Percentages are given for categorical variables, and means with standard deviations or medians (min-max) for continuous variables after testing for normality with the Shapiro-Wilk test. The sub-categories of the SUMD and the BIS are described in **Table 2**.

As distributions of scores on the four sub-scales of the BPAQ were skewed (**Figures 1a to 1d)**, associations between sub-scales were examined using Spearman correlation coefficients. For the comparative analyses, we chose to group scores into terciles and compare, for each sub-scale, the highest tercile (representing severe aggressiveness) to the lowest two terciles (**Table 3**). SUMD symptom awareness and attribution scores were also grouped into terciles. Ordinal scores on the BIS sub-scales were grouped into categories reflecting low, moderate, high levels of insight.

Univariate associations were tested using logistic regression models, adjusted for age, sex and diagnosis (schizophrenia versus other). Associations with p-values <0.10 in the univariate analysis were further examined in a multivariate analysis. Socio-demographic and clinical variables associated with at least one sub-type of aggressiveness ($p<0.20$) were entered as adjustment variables. Choices were made between strongly inter-correlated variables measuring similar concepts. A first model was run, adjusting for age, sex, diagnosis, education, duration of untreated psychosis and total PANSS score. A second model was run further adjusted for depression. The significance level was set at $p<0.0125$ to account for multiple testing with four dependant variables. Analyses were carried out using SAS version 9.4 (SAS Institute, Cary, NC, USA).

3. **Results**

Patients included in the analysis (666) were compared to those excluded due to missing data on the BPAQ scale (110). There were no differences for the main socio-demographic and clinical variables except for global functioning ($p=0.03$) and PANSS positive scores ($p=0.03$), both showing more severe levels in excluded patients.

Of the patients, 74.8% were male and mean age was 31.9 years (SD 9.3) (Table 1). The main diagnosis (according to the DSM IV) was schizophrenia; 82% of patients had been hospitalised at least once and mean age at first hospital admission was 23.6 years (SD 7.1). Sixty point five per cent of patients reported a psychotic episode in the past year. The mean total PANSS score was 70.9 (SD 18.9) and general functioning score 49.1 (SD 13.0). One third (30.9%) of the sample had clinical depression.

The distributions of scores on the four aggressiveness sub-scales are presented in Figures 1a to 1d, with an indication for each sub-scale of the tercile cut-off values. Correlation coefficients between the sub-scales ranged from 0.43 between physical and verbal aggressiveness, to 0.52 between verbal aggressiveness and anger (all p-values<0.0001) (not shown).

The SUMD and BIS insight dimensions are described in Table 2. More than half of the patients were aware of their illness (50.6%), of the consequences of their illness (54.4%) or of the necessity for treatment (55%), as measured by the SUMD.

Hostility was the aggressiveness sub-scale the most strongly associated with insight (Table 3). Significant associations between SUMD and BIS insight dimensions and hostility showed positive relationships, with greater awareness in the severely aggressive terciles. Conversely SUMD awareness of the consequences of illness was related to lower anger, and BIS awareness of treatment necessity to lower verbal aggressiveness.

In the multivariate analysis, associations between the SUMD awareness dimensions and hostility remained significant in Model 1 with patients aware of their illness nearly twice as likely to show hostility than those seriously unaware (OR=2.52, 95% CI.: 1.42-4.46), but not when further adjusting for depression (Table 4). Similarly, in Model 1, patients aware of the consequences of their illness (OR=2.78, 95% CI.: 1.58-4.87) and of their symptoms (OR=2.45, 95% CI.: 1.54-3.91) were more likely to be hostile. Patients moderately aware of the consequences of their illness were more likely to exhibit both physical aggressiveness (OR=2.47, 95% CI.: 1.33-4.60) and anger (OR=2.63, 95% CI.: 1.42-4.86), even when adjusting for depression for anger.

PANSS hostility and PANSS insight were very weakly correlated (Spearman r=0.18, p<0.0001), with a trend towards hostile symptoms increasing with lack of insight. PANSS hostility, whether studied as an ordinal variable (score 1 to 7) or a binary variable (categories 1-2 versus 3+), was associated with none of the dimensions of the SUMD or the BIS.

4. Discussion

This study is one of the first to examine the relationship between insight and aggressiveness, both considered as multi-dimensional concepts, in a large sample of patients. Our findings suggest specific sub-types of aggressiveness are linked to specific insight dimensions.

Hostility is the dimension of aggressiveness the most strongly associated with the different dimensions of insight. We found that hostility increased with increasing awareness. To the

best of our knowledge, this is the first study to examine the link between hostility measured by BPAQ and insight. Krakowski and Czobor (2012) found that patients in denial of their crime had lower global scores on the BPAQ; they did not however examine the relationships between insight and BPAQ, overall or for each dimension. They also found the opposite relationship between PANSS-measured hostility (G14) and insight (G12) (Krakowski and Czobor, 2012). Hostility as a psychotic symptom assessed by the clinician (PANSS) appears to differ from hostility as a trait measure of individual aggressive tendencies reported by the subject (BPAQ). Hostility as a symptom has frequently been associated with lack of insight (Czobor et al., 2015; Lera Calatayud et al., 2012; Volavka, 2014). Our findings support this inversed relationship between hostile symptoms and insight, both measured using the PANSS. Conversely in our study, BPAQ-measured hostility trait was associated positively with the awareness of having a disease, its consequences and symptoms. But these associations were no longer significant when adjusting for the potential confounding effect of depression, whether clinical depression (as shown in the tables) or depressive symptomatology (on a continuum). This suggests that depression may be a mediating factor on the pathway between insight and self-reported hostility.

In our sample, depression was common (30% of patients). It was found to be positively and strongly associated with better insight (except for awareness of treatment necessity), as in many previous studies (Belvederi Murri et al., 2015; Mintz et al., 2003b).

Self-stigma seems to be a relevant mediator of the association between better insight and depression among patients with schizophrenia (Belvederi Murri et al., 2016; Lien et al., 2016) and could be also a possible explanation for the link with hostility. As a consequence, patients having better insight and depression probably experience a higher level of self-stigma that could lead to the expression of an underlying hostile tendency (trait). We were not able to test this hypothesis that was beyond the scope of our study.

To our knowledge, there are no previous studies on anger and insight. Our findings from the multivariate analysis suggest that anger increases with awareness of the consequences of illness event when adjusting for depression, with the highest association found for patients who were partially aware.

A borderline significant relationship was found in Model 1 between awareness of the consequences of illness and physical aggressiveness with the strongest association being for those who were partially aware. Findings regarding physical aggressiveness run counter to previous studies in which the most physically aggressive patients lacked insight in all clinical

and cognitive dimensions (Arango et al., 1999; Buckley et al., 2004; Ekinci et al., 2012). However, these studies involved smaller sample sizes, sometimes measuring actual physical aggression rather than threat (Buckley), and did not always adjust for confounders. Moreover, once again it is the awareness of the consequences of illness insight dimension that is linked to aggressiveness. This strengthens our hypothesis that specific dimensions of insight could reveal different underlying aggressive tendencies.

Anger and physical aggression are more impulsive and reactional dimensions of aggressiveness, more related to emotional state and less related to cognitive processes. This could explain why they are more marked in intermediate and / or unstable states of insight.

These findings are important for setting up therapeutic programmes to improve insight. Although the direction of the associations cannot be established from our findings, anger and subsequent hostility must be taken into account as possible consequences of improving insight in patients with schizophrenia. The potential mediating effect of depression must also be considered, specifically for hostility. A longitudinal approach is necessary to better understand this relationship and its underlying mechanism.

Our study is original, as to the best of our knowledge it is the first to examine in a large patient sample the association between insight dimensions and different types of aggressiveness. Furthermore, insight was measured using two validated scales, one self-report and one clinician-administered, assessing different approaches to insight. Aggressiveness was also assessed using a validated scale, the BPAQ, which explores instrumental, emotional and cognitive dimensions. Additionally, we were able to adjust for a large number of potential confounders, including depression.

The main limitation is the cross-sectional design of our study. Consequently the causality of the associations between insight and aggressiveness cannot be established. We are not able to conclude that improving insight leads to expressing more aggressive traits. Despite its size, the sample is unlikely to be representative of patients with SZ, given that it was drawn from a cohort constituted from expert centers which were set up primarily to provide expert clinical assessments on request from other clinicians. Also, there was limited data on type of medication and substance abuse was recorded for a sub-sample only.

Our study confirms that a multi-dimensional approach to complex clinical concepts such as insight and aggressiveness is essential. From a therapeutic point of view, improving illness

awareness promotes better adherence to care (Czobor et al., 2015). However, alongside efforts to improve patient insight, it is important to take into account a possible increase in aggressiveness, notably hostility. Further studies are necessary to understand the underlying mechanisms of the associations between insight and aggressiveness dimensions.

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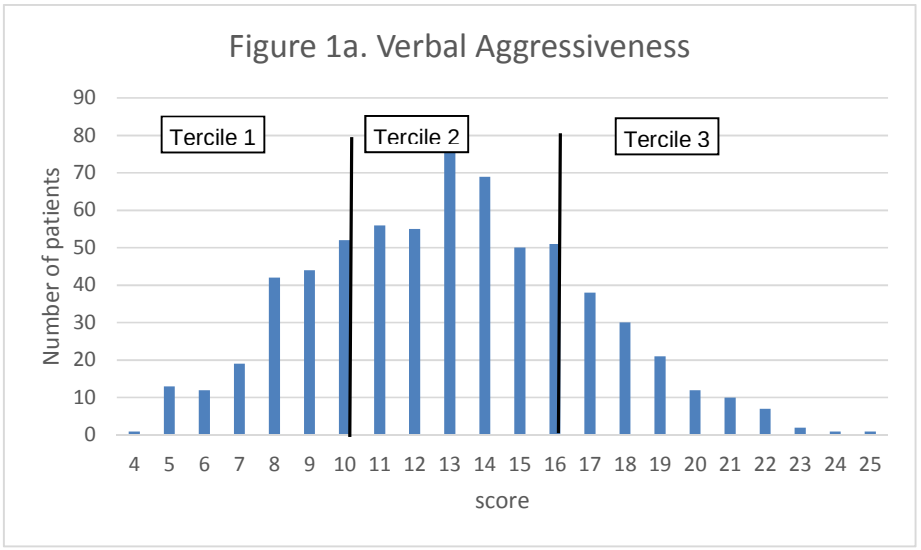
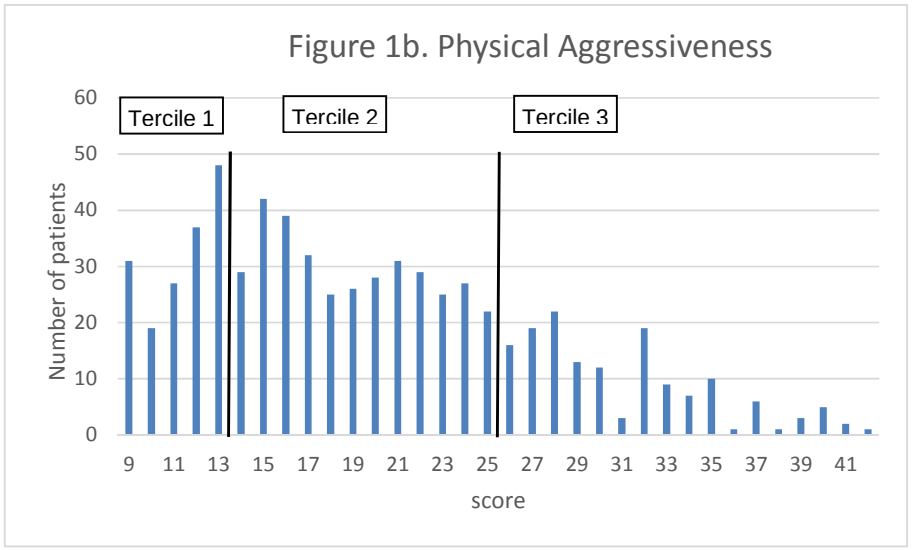
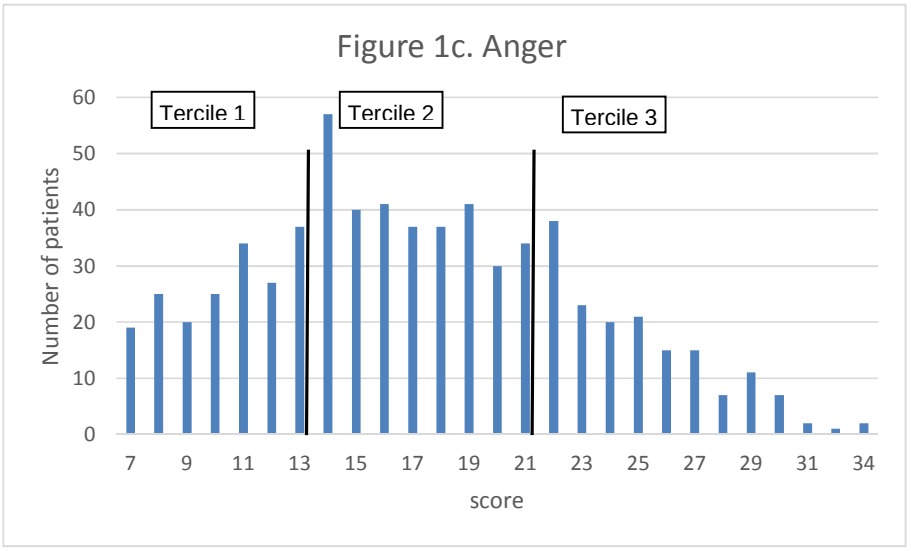
Figures 1a, 1b, 1c, 1d. Description of the four types of aggressiveness (BPAQ) **(For colour reproduction)**







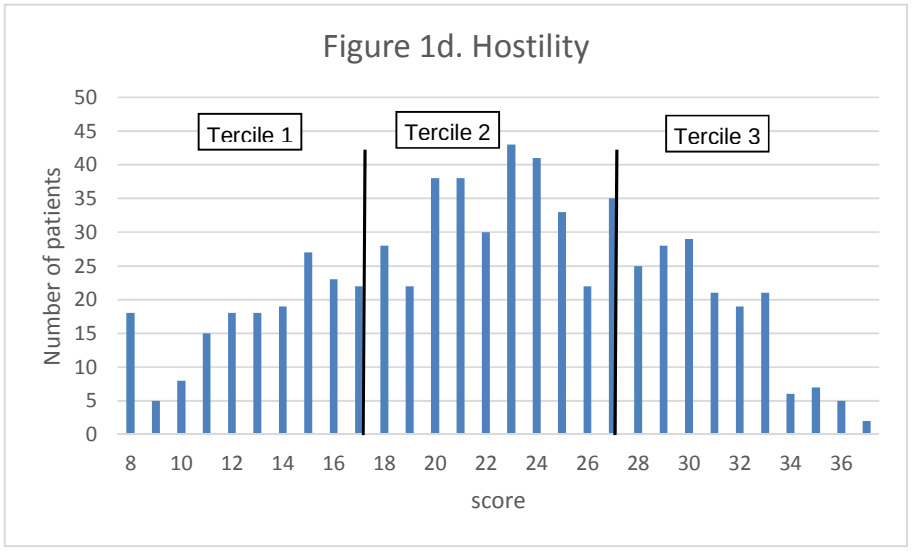


Table 1. Socio-demographic and clinical characteristics of the sample (N=666)

	N	%
Age (mean, sd)	666	31.9 (9.3)
Sex (male)	666	74.8
Education :	602	
Low		23.3
Moderate (high school)		34.7
High (university)		42.0
Marital Status :	592	
Single		85.1
Married, living together		10.5
Other (divorced, separated, widowed,…)		4.4
Occupation :	476	
Employed		15.1
Unemployed		65.5
Other (student, retired,…)		19.3
Living alone (yes)	601	28.3
Substance abuse (yes) *	419	30.3
DSMIV diagnosis:	666	
Schizophrenia		75.4
Schizoaffective disorder		22.8
Schizophreniform disorder		1.8
Age first psychotic episode (mean, sd)	626	21.5 (6.5)
Age first hospitalisation (mean, sd)	550	23.6 (7.1)
Duration Untreated Psychosis (>1 yr)	558	33.4
Depression (Calgary score$\geq$6)	592	30.9
Global functioning score (mean, sd)	637	49.1 (13.0)
Psychotic episode in past year	574	60.5
PANSS Scores (mean, sd):		
Positive	648	14.7 (5.5)
Negative	647	20.6 (7.2)
General Psychopathology	647	35.6 (10.1)
Total score	646	70.9 (18.9)
Medication *:		
Antipsychotic medication	490	79.6
Anxiolytic medication	490	23.1
Hypnotic medication	490	6.9
Antidepressant medication	490	28.9

* Available for a sub-sample of patients

Table 2. Description of the insight dimensions according to the SUMD (N=636) and the BIS (N=613)

	%
Insight	
SUMD Insight dimensions:	
Awareness of illness	
Aware (1)	50.6
Slightly aware/unaware (2)	31.9
Seriously unaware (3)	17.5
Awareness of consequences of illness*	
Aware (1)	54.4
Slightly aware/unaware (2)	28.5
Seriously unaware (3)	17.1
Awareness of effect of medication*	
Aware (1)	55.0
Slightly aware/unaware (2)	31.2
Seriously unaware (3)	13.8
Awareness of the 5 main symptoms (median, min-max)*	1.5 (1-3)
Attribution of symptoms (median, min-max) (N=541)	2 (1-3)
Birchwood insight dimensions:	
Awareness of illness	
Low (0,1,2)	20.2
Moderate (3)	38.7
High (4)	41.1
Awareness of symptoms	
Low (0,1)	32.3
Moderate (2,3)	20.1
High (4)	47.6
Awareness of necessity of treatment	
Low (<3)	18.9
Moderate (3-4[)	38.8
High (≥4)	42.3

*for these variables, patients with a score of 0 (not applicable) were reclassified as Aware (1), as this usually corresponds to an absence of consequences of illness, medication or symptoms. The number of patients concerned for each variable was 9, 17 and 28, respectively.

Table 3. Type of aggressiveness (tercile 1&2 versus 3) according to SUMD (N=636) and BIS insight dimensions (N=613): univariate logistic regression analysis, adjusted for sex, age and diagnosis (schizophrenia versus other)

		Verbal Aggressiveness			Physical Aggressiveness			Anger			Hostility		
	n	1-2	3		1-2	3		1-2	3		1-2	3	
		%	%	p	%	%	p	%	%	p	%	%	p
SUMD Insight dimensions :		(425)	(211)		(425)	(211)		(423)	(213)		(395)	(241)	
Awareness of illness													
Seriously unaware	105	16.7	16.1		18.4	12.8		17.2	15.0		20.0	10.8	
Slightly aware/unaware	203	30.6	34.6		32.2	31.3		33.6	28.7		33.2	29.9	
Aware	328	52.7	49.3	0.49	49.4	55.9	0.10	49.2	56.3	0.29	46.8	59.3	0.003
Awareness of consequences of illness													
Seriously unaware	109	17.2	17.0		18.8	13.7		18.7	14.1		20.5	11.6	
Slightly aware/unaware	181	26.8	31.8		26.1	33.2		25.0	35.2		30.4	25.3	
Aware	346	56.0	51.2	0.26	55.1	53.1	0.05	56.3	50.7	0.009	49.1	63.1	0.002
Awareness of effect of medication													
Seriously unaware	88	12.9	15.6		14.6	12.3		14.9	11.7		15.7	10.8	
Slightly aware/unaware	198	31.3	30.8		31.3	30.8		30.3	32.9		32.7	28.6	
Aware	350	55.8	53.6	0.61	54.1	56.9	0.64	54.8	55.4	0.54	51.6	60.6	0.07
Awareness of 5 main symptoms (terciles)													
Low –unaware	231	35.1	38.9		37.2	34.6		36.2	36.6		41.5	27.8	
Moderate –slightly aware	186	28.7	30.3		27.7	32.2		30.0	27.7		28.4	30.7	
High - aware	219	36.2	30.8	0.31	35.1	33.2	0.48	33.8	35.7	0.78	30.1	41.5	0.002
Attribution of symptoms (terciles)*													
Low - Incorrect	284	50.8	55.7		52.7	52.1		52.6	52.2		56.8	45.7	
Moderate - partially correct	145	27.1	26.2		26.2	28.0		27.3	25.8		24.9	29.8	
High - correct	112	22.1	18.0	0.45	21.1	19.9	0.896	20.1	21.9	0.86	18.3	24.2	0.04
Birchwood insight dimensions		(407)	(206)		(405)	(208)		(403)	(210)		(372)	(241)	
Awareness of illness													
Low	124	19.9	20.9		22.0	16.8		22.6	15.7		24.2	14.1	
Moderate	237	39.6	36.9		36.8	42.3		36.5	42.9		38.4	39.0	
High	252	40.5	42.2	0.75	41.2	40.9	0.24	40.9	41.4	0.09	37.4	46.9	0.005
Awareness of symptoms													
Low	198	30.7	35.4		33.1	30.7		34.2	28.5		35.5	27.4	
Moderate	123	21.4	17.5		21.0	18.3		19.6	21.0		19.9	20.3	
High	292	47.9	47.1	0.46	45.9	51.0	0.38	46.2	50.5	0.28	44.6	52.3	0.09
Awareness of necessity of treatment													
Low	116	15.2	26.2		18.5	19.7		19.8	17.2		19.6	17.8	
Moderate	238	41.8	33.0		38.3	39.9		39.5	37.6		39.5	37.8	
High	259	43.0	40.8	0.006	43.2	40.4	0.98	40.7	45.2	0.45	40.9	44.4	0.65

Table 4. . Type of aggressiveness (tercile 1&2 versus 3) according to SUMD (N=539) and BIS insight dimensions (N=500): multivariate logistic regression analysis

	N	Model 1*			Model 2**		
		OR	95% CI	p	OR	95% CI	p
Verbal Aggressiveness							
BIS Awareness of necessity of treatment							
Low	95	1					
Moderate	193	0.48	(0.28-0.82)				
High	212	0.64	(0.38-1.09)	0.03			
Physical Aggressiveness							
SUMD Awareness of illness							
Seriously unaware	84	1					
Slightly aware/unaware	176	1.76	(0.95-3.29)				
Aware	279	2.32	(1.26-4.27)	0.02			
SUMD Awareness of consequences							
Seriously unaware	89	1			1		
Slightly aware/unaware	149	2.57	(1.38-4.77)		2.47	(1.33-4.60)	
Aware	301	2.03	(1.12-3.66)	0.01	1.83	(1.00-3.35)	0.02
Anger							
SUMD Awareness of consequences							
Seriously unaware	89	1			1		
Slightly aware/unaware	149	2.75	(1.49-5.08)		2.63	(1.42-4.86)	
Aware	301	1.92	(1.07-3.45)	0.005	1.71	(0.94-3.10)	0.006
BIS Awareness of illness							
Low	105	1					
Moderate	194	1.54	(0.89-2.64)				
High	201	1.67	(0.97-2.89)	0.17			
Hostility							
SUMD Awareness of illness							
Seriously unaware	84	1			1		
Slightly aware/unaware	176	1.56	(0.87-2.82)		1.33	(0.73-2.42)	
Aware	279	2.52	(1.42-4.46)	0.003	1.95	(1.08-3.50)	0.044
SUMD Awareness of consequences							
Seriously unaware	89	1			1		
Slightly aware/unaware	149	1.55	(0.85-2.83)		1.38	(0.75-2.54)	
Aware	301	2.78	(1.58-4.87)	0.0004	2.15	(1.21-3.82)	0.016
SUMD Awareness of effect of medication							
Seriously unaware	75	1					
Slightly aware/unaware	172	1.22	(0.67-2.23)				
Aware	292	1.95	(1.10-3.46)	0.02			
SUMD Awareness of symptoms (terciles)							
Low –unaware	196	1			1		
Moderate –slightly aware	159	1.54	(0.92-2.43)		1.22	(0.76-1.97)	
High - aware	184	2.45	(1.54-3.91)	0.0008	1.90	(1.17-3.09)	0.026
SUMD Attribution of symptoms (terciles)							
Low - Incorrect	243	1					
Moderate - partially correct	120	1.61	(1.01-2.57)				
High - correct	97	1.88	(1.15-3.09)	0.021			
BIS Awareness of symptoms							
Low	162	1					
Moderate	94	1.28	(0.75-2.18)				
High	244	1.42	(0.93-2.18)	0.27			
BIS Awareness of illness							
Low	105	1					
Moderate	194	1.52	(0.91-2.55)				
High	201	2.09	(1.24-3.52)	0.020			

*Model 1: adjusted for sex, age, diagnosis, education, duration untreated psychosis (>1 yr), PANSS total score

** Model 2: further adjusted for depression (score $\geq$6